

SELF-ALIGNED GATED CARBON NANOTUBE FIELD EMITTER
STRUCTURES AND ASSOCIATED METHODS OF FABRICATION

ABSTRACT OF THE DISCLOSURE

A method for fabricating a self-aligned gated carbon nanotube field emitter structure includes providing a substrate, depositing a dielectric material on the surface of the substrate and depositing a conductor layer on the surface of the dielectric material. The method also includes selectively etching the conductor layer to form an opening and selectively etching the dielectric material to form a micro-cavity. The method further includes depositing a base layer structure in the micro-cavity adjacent to the surface of the substrate, wherein the base layer structure has a substantially conical shape, and depositing a catalyst on a portion of the surface of the base layer structure, wherein the catalyst is suitable for growing at least one carbon nanotube. The method still further includes applying an electrical potential to the substrate and the conductor layer, wherein the electrical potential generates a plurality of electrical field lines that are deflected around the surface of the base layer structure, and wherein the plurality of electrical field lines have a strength that is greatest in a direction substantially perpendicular to the surface of the substrate. Finally, the method includes growing at least one carbon nanotube from the catalyst in the presence of the plurality of electrical field lines, wherein the at least one carbon nanotube is grown in a direction substantially perpendicular to the surface of the substrate.